Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application. Applicants have submitted a new complete claim set showing any marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

Listing of Claims:

1.   (Currently amended) A computer system that enforces user specified currency constraints on a query on a database system having a query optimizer, a query processing engine and one or more local replicas of data in remote data sources, the computer system comprising:

at least one memory; and

at least one processing unit, comprising:

a constraint parser that interprets and converts the user specified currency constraint into a form usable by the query optimizer, wherein the currency constraint includes a consistency constraint and the constraint parser parses the consistency constraint;

a query plan generator that constructs a query plan for executing the query, wherein the plan includes one or more subplan selection operators that check a currency of a local replica against the query's currency constraint and selects the subplan using the local replica only when the constraint is met; and

wherein the query processing engine executes the query plan, including the subplan selection operators, thereby producing a result that satisfies the query's currency constraints.

2.   (Currently amended) The computer system of claim 1 comprising a currency constraint normalizer that resolves a plurality of currency constraints into a single constraint representing a least upper bound of the currency constraints.

3.   (Currently amended) The <u>computer</u> system of claim 1 wherein tables in the local replica are grouped into currency regions and wherein the data in all tables in a currency group correspond to the same database state.

4.   (Currently amended) The <u>computer</u> system of claim 3 comprising a heartbeat mechanism that includes a global heartbeat table and local replicated heartbeat tables that keep track of the currency of local replicas.

5.   (Currently amended) The <u>computer</u> system of claim 4 wherein the data source selection operator accesses a local heartbeat table to determine whether the currency of local replica meets the currency constraint.

6.   (Currently amended) The <u>computer</u> system of claim 1 wherein the query optimizer estimates a cost associated with a query plan to be executed using a local replica based on a probability that the local replica will meet the currency constraint of the query.

7.   (Canceled)

8.   (Currently amended) The <u>computer</u> system of claim 1~~7~~ wherein the query plan generator verifies possible query plans against the query's consistency constraint and rejects plans that do not meet the consistency constraint.

9.   (Currently amended) The <u>computer</u> system of claim 1~~7~~ comprising a consistency constraint normalizer that resolves a plurality of consistency constraints into a single consistency constraint representing a least upper bound of the constraints.

10.   (Currently amended) The <u>computer</u> system of claim 1~~7~~ comprising a timeline

consistency constraint generator that appends the currency constraints with a session data age such that data in the local replica must be older than the session data age.

11.   (Currently amended) The computer system of claim 8 wherein the query plan generator derives a delivered consistency property for each plan based on physical operators in the plan and compares the delivered consistency with the query's consistency constraint.

12.   (Currently amended) The computer system of claim 8 wherein tables in the local data source are grouped into currency regions and wherein the query plan generator verifies that all inputs in a query plan that must be consistent belong to the same currency region.

13.   (Currently amended) A method for specifying and enforcing user specified currency and consistency constraintsrequirements associated with a database query, comprising:

parsing a user specified currency and consistency constraint stored in a memory to interpret and convert the constraint into a form usable by a query optimizer;

constructing query execution plans that include a subplan selection operator that verifies a currency of a local replica against the query's currency constraint and selects the subplan using the local replica only when the local replica's data meets the currency constraint;

verifying the query execution plans against the query's consistency constraints and rejecting any plans that do not meet the consistency constraint; and

executing the query plan, including any subplan selection operators, thereby producing a result that satisfies the query's currency and consistency constraints.

14.   (Original) The method of claim 13 comprising resolving a plurality of currency and consistency constraints associated with the database query into a single currency and consistency constraint that represents a least upper bound of the constraints.

15.   (Original) The method of claim 14 comprising grouping tables a local replica into

currency regions wherein the data in all tables in a currency region always correspond to the same database state.

16.   (Original) The method of claim 15 comprising maintaining global and locally replicated logs of the update status of each of the currency regions.

17.   (Original) The method of claim 16 wherein the subplan selection operator refers to information in a log to verify the currency of the local replica.

18.   (Original) The method of claim 15 wherein possible query plans are evaluated by determining a delivered consistency based on physical operators in the query plan that group input tables into sets of consistent input tables and verifies that the input tables in a set of consistent input tables belong to the same currency region.

19.   (Original) The method of claim 13 comprising estimating a cost associated with a query plan to be executed using a local replica based on a probability that the local replica will meet the currency constraint of the query.

20.   (Original) Computer-readable media comprising computer-executable instructions for performing the method of claim 13.

21.   (Currently amended) For use with a database system, computer readable media comprising computer-executable instructions for enforcing user specified currency constraints on a query on the database system, wherein the database system has local replicas of data in remote data sources, the instructions comprising:

interpreting and converting the user specified currency constraint into a form usable by a query optimizer, wherein the currency constraint includes a consistency constraint and wherein the instructions comprise parsing the consistency constraint;

constructing a query plan for executing the query, wherein the plan includes a subplan selection operator that checks a currency of a local replica against the query's currency constraint and selects the subplan using the local replica only when the constraint is met; and

executing the query plan, including the subplan selection operators, thereby producing a result that satisfies the query's currency requirements.

22.   (Original) The computer readable media of claim 21 wherein the instructions comprise resolving a plurality of currency constraints into a single constraint that represents a least upper bound of the currency constraints.

23.   (Original) The computer readable media of claim 21 wherein the instructions comprise grouping tables in the local data sources into currency regions and wherein the data in all tables within a currency region always correspond to the same database state.

24.   (Original) The computer readable media of claim 23 wherein the instructions comprise utilizing a heartbeat mechanism to maintain a global heartbeat table and local replicated heartbeat tables that track the currency of local replicas.

25.   (Original) The computer readable media of claim 24 wherein the subplan selection operator accesses a local heartbeat table to determine whether the currency of local data source meets the currency constraint.

26.   (Original) The computer readable media of claim 21 wherein the instructions comprise estimating a cost associated with a query plan to be executed using a local replica based on a probability that the local replica will meet the currency constraint of the query.

27.   (Canceled)

28.   (Currently amended) The computer readable media of claim 21~~27~~ wherein the instructions comprise verifying possible query plans against the query's consistency constraint and rejecting plans that do not meet the consistency constraint.

29.   (Original) The computer readable media of claim 28 wherein the instructions comprise resolving a plurality of consistency constraints into a single consistency constraint that represents a least upper bound of the constraints.

30.   (Currently amended) The computer readable media of claim 21~~27~~ wherein the instructions comprise deriving a delivered consistency property for each plan based on physical operators in the plan and comparing the delivered consistency with the query's consistency constraint.

31.   (Original) The computer readable media of claim 28 wherein the instructions comprise grouping tables in the local replica into currency regions and verifying that all inputs in a query plan that must be consistent belong to the same currency region.

32.   (Currently amended) An apparatus for specifying and enforcing user specified currency and consistency constraints~~requirements~~ associated with a database query, comprising:

    means for interpreting and converting the user specified currency constraint into a form usable by a query optimizer, wherein the currency constraint includes a consistency constraint;

    means for interpreting and converting the consistency constraint;

    means for constructing a query plan for executing the query, wherein the plan includes a subplan selection operator that checks a currency of a local replica against the query's currency constraint and selects the subplan using the local replica only when the constraint is met; and

    means for executing the query plan, including the subplan selection operators, thereby producing a result that satisfies the query's currency requirements.

33.   (Original) The apparatus of claim 32 including means for resolving a plurality of currency constraints into a single constraint that represents a least upper bound of the currency constraints.

34.   (Original) The apparatus of claim 32 comprising means for grouping tables in the local data sources into currency regions and wherein the data in all tables within a currency region always correspond to the same database state.

35.   (Original) The apparatus of claim 34 wherein the means for grouping utilizes a heartbeat mechanism to maintain a global heartbeat table and local replicated heartbeat tables that track the currency of local replicas.

36.   (Original) The apparatus of claim 35 wherein the subplan selection operator accesses a local heartbeat table to determine whether the currency of local data source meets the currency constraint.

37.   (Original) The apparatus of claim 32 comprising means for estimating a cost associated with a query plan to be executed using a local replica based on a probability that the local replica will meet the currency constraint of the query.

38.   (Canceled)

39.   (Currently amended) The apparatus of claim 32~~38~~ comprising means for verifying possible query plans against the query's consistency constraint and rejecting plans that do not meet the consistency constraint.

40.   (Original) The apparatus of claim 39 comprising means for resolving a plurality of consistency constraints into a single consistency constraint that represents a least upper bound

of the constraints.

41.   (Currently amended) The apparatus of claim 32~~38~~ comprising means for deriving a delivered consistency property for each plan based on physical operators in the plan and comparing the delivered consistency with the query's consistency constraint.